WHAT IS CLAIMED IS

1. A thixocast Fe-based alloy material comprising

1.8 % by weight ≤ C ≤ 2.5 % by weight,

1.0 % by weight ≤ Si ≤ 3.0 % by weight,

0.1 % by weight ≤ Mn ≤ 1.5 % by weight,

0.5 % by weight ≤ Ni ≤ 3.0 % by weight, and

as the balance, iron (Fe) including inevitable impurities,

wherein a eutectic crystal amount Ec is in a range of 10 % by weight < Ec < 50 % by weight.

2. A thixocast Fe-based alloy material comprising

1.8 % by weight ≤ C ≤ 2.5 % by weight

1.0 % by weight ≤ Si ≤ 3.0 % by weight

0.8 % by weight ≤ Mn ≤ 1.5 % by weight, and

as the balance, iron (Fe) including inevitable impurities,

wherein a eutectic crystal amount Ec is in a range 10 % by weight < Ec < 50 % by weight.

3. A thixocast Fe-based alloy material, comprising carbon (C) of a content in a range of 1.8 % by weight ≤ C ≤ 2.5 % by weight, silicon (Si) of a content in a range of 1.0 % by weight ≤ Si ≤ 3.0 % by weight, manganese (Mn) of a content in a range of 0.6 % by weight ≤ Mn ≤ 1.5 % by weight, at least one of nickel (Ni) of a content in a range of 0.2 % by weight ≤ Ni ≤ 3.0 %

by weight and titanium (Ti) of a content in a range of 0.05 %

by weight ≤ Ti ≤ 0.6 % by weight, the total sum of the Mn content,

the Ni content and the Ti content being equal to or larger than

0.8 % by weight (Mn + Ni + Ti ≥ 0.8 % by weight), and the balance

5   being iron (Fe) including inevitable impurities, wherein a

eutectic crystal amount is in a range of 10 % by weight < Ec

< 50 % by weight.

4. A thixocast Fe-based alloy material according to claim 1,

2 or 3, wherein a solid phase rate R in a semi-molten state is

10   set at R > 50 %.

5. A process for heating a thixocast Fe-based alloy material

having a chilled structure into a semi-molten state in which

solid and liquid phases coexist,

the process comprising setting an average rate H_R of heating

15   to a point A_1 in an Fe-C based equilibrium diagram to be in a

range of 0.5°C/sec ≤ H_R ≤ 6.0°C/sec, and setting a maximum

temperature gradient T_G of the inside of the Fe-based alloy

material per unit distance to be at T_G ≤ 7°C/mm.

6. A process for heating a thixocast Fe-based alloy material

20   according to claim 5, further setting a sonic velocity Sv of

said Fe-based alloy material determined by an ultrasonic velocity

measurement to be at Sv ≥ 5,600 m/sec.